Management of Oral Pathologic Lesions

The dentist in general practice has a more thorough and continuous exposure to his or her patients' oral cavities and perioial areas than any other health care provider. Therefore the dentist is responsible for maintaining the overall health and well being of these structures. Whether directly involved in the surgical management of pathologic entities or indirectly involved through referral to another health care provider, the dentist is the individual who provides the needed continuity of care to help ensure adequate patient follow-up and dental reconstructive efforts.

The unique role of general dentists as oral health experts requires them to be constantly on the lookout for pathologic lesions during the everyday care of patients. General dentists must be aware of the natural history of the more common maxillofacial disease processes and must be astute diagnosticians. As with any disease process in dentistry and medicine, prevention is the best form of therapy, and early diagnosis and treatment is the est way of managing pathologic entities.

The next two chapters describe the role that the general dentist should assume in the management of a patient's pathologic conditions. The *most* important aspect of this care begins with a thorough patient examination and an accurate diagnosis of disease. Chapter 21 covers these topics in detail and in a fashion meaningful to the general dentist. Chapter 22 describes the surgical management of pathologic diseases of the oral cavity and contiguous structures. Details of surgical technique are provided in depth for lesions that the general dentist may encounter. The surgical management of major pathologic conditions and tumors of the oral and maxillofacial region is also presented, but the emphasis is on the general dentist's role in overall patient management.

Principles of Differential Diagnosis and Biopsy

CHAPTER

Edward

CHAPTER OUTLINE

EXAMINATION AND DIAGNOSTIC METHODS

Lesions of the oral cavity and periora) areas *must be* identified and characterized so that specific therapy can lead to elimination of the lesion. When a lesion is discovered, several important, orderly steps should be undertaken to identify and characterize it (Fig. 21-1). These steps include the health history, history of the specific lesion, clinical examination, radiographic examination, laboratory investigation, and, if indicated, surgical procedures to obtain a specimen for pathologic examination.

When the patient or dentist discovers a lesion, the dentist must be careful how this information is discussed with the patient. The words *lesion, tumor, growth* ,and *biopsy* carry terrifying connotations to many patient.

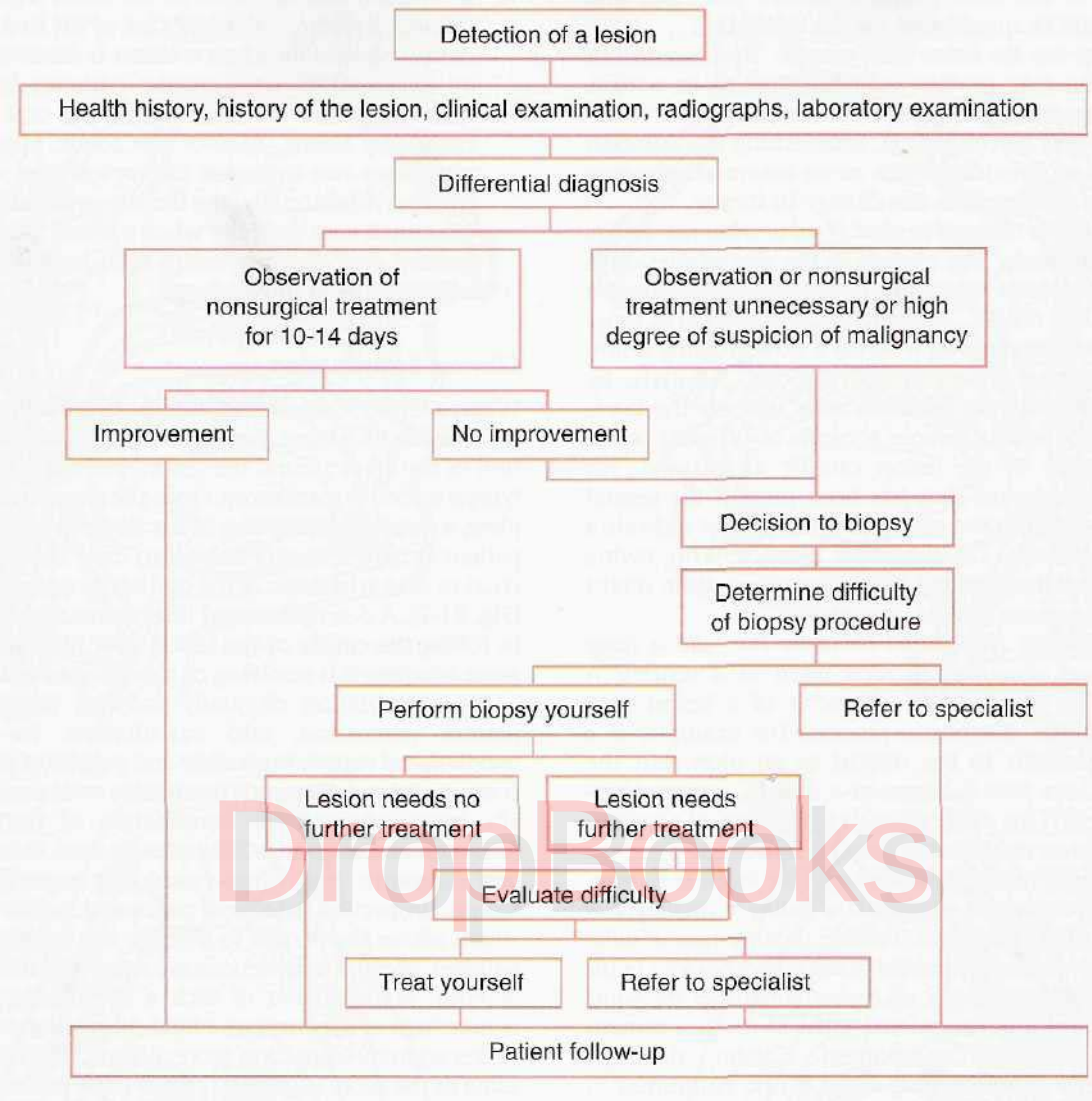

FIG. 21-1 Decision tree for treatment of oral lesions.

The empathetic dentist can spare patients from anxiety and frustration by carefully wording the discussion of the lesion. It behooves the dentist to remember and make the patient aware that the vast majority of lesions discovered in the oral and maxillofacial area are benign.

Health History

The overall medical status of the patient is of paramount importance when investigating a lesion. An accurate health history and, if needed, a thorough clinical evaluation or consultation with medical specialists are mandatory for two basic reasons:

1. The first reason is that a preexisting medical problem may affect or be affected by the dentist's treatment of the patient. As outlined in Chapters 1 and 2, patients with certain medical conditions, such as congenital heart defects, coagulopathies, and hypertension, may require special precautions when any surgical treatment is required. Furthermore, surgical intervention may upset the delicate balance between health and disease in a poorly controlled diabetic or immunocompromised person.
2. The second reason for a thorough knowledge of the patient's overall health status is that the lesion under investigation may be an oral manifestation of a systemic disease. For instance, a patient with agranulo-cytosis or Crohn's disease may have oral lesions. An ulcer in a chronic smoker should alert the dentist to the possibility of carcinoma. Literally hundreds of systemic disease processes can present orally, so the dentist should be aware of them and cognizant of any of their oral presentations.

History of the Specific Lesion

It is generally accepted that 85% to 90% of systemic diseases can be discovered by a thorough and properly gathered health history. The same can be true of many lesions of the oral cavity when the diagnostician knows the nat-

ural history of the more common disease processes. The patient should be questioned for the following:

1. *How long has the lesion been present?* The duration of the lesion may provide valuable clues to its nature.For instance, a lesion that has been present for several years may be congenital. Establishing the duration of a lesion provides much more information whentaken in concert with the change in its size.
2. *Has the lesion changed in size? If so, at what rate and to what magnitude?* The change in the size of a lesion isone of the most important pieces of information thedentist can obtain. A rapidly growing lesion is morelikely to be aggressive, whereas a slow-growing lesion may indicate a more benign process. Similarly, by combining this information with that on the duration of the lesion, a more accurate assessment of the true nature of the lesion can be ascertained. For instance, a lesion that has been present for several months and has not changed in size might indicate a benign process. On the other hand, a fast-growing lesion that has existed for only a short time might indicate a more serious process.
3. *Has the lesion changed in character (i.e., did a lump become an ulcer; did an ulcer begin as a vesicle)?* A change in the physical character of a lesion may assist in the diagnostic process. For example, if alesion presents to the dentist as an ulcer, but the patient says that it began as a vesicle, a more thorough search for other signs or symptoms of a vesicu-lobullous or viral disease may be indicated.
4. *What symptoms are associated with the lesion (e.g., pain,abnormal sensations, anesthesia, a feeling of swelling, badtaste or smell, dysphagia, swelling or tenderness of adjacent lymph nodes)? If painful, what is the character of the pain? What exacerbates and what diminishes the pain?*Pain is most often associated with lesions that contain an inflammatory component. Cancer, although feared as a painful lesion, often is not. Numbness in the distribution of one of the sensory nerves usually indicates an inflammatory or malignant process,unless other physical causes can be ascertained. Dysphagia indicates that the muscles of deglutition or the contents of the floor of the mouth or parapharyngeal areas are involved. Swelling may be one of the more common symptoms associated with oral lesions,which indicates nothing more than an expansile process that can result from a variety of causes. It is important to note that the patient may feel a sensation of swelling or fullness before the clinician can
actually identify swelling by clinical examination. In general, tender lymph nodes indicate an inflammatory or infectious cause of the lesion. Thus clues to the nature of the lesion should be sought and the patient carefully questioned about associated symptoms.
5. *Are there any associated constitutional symptoms (e.g.,fever, nausea, anorexia)?* With this question the dentist is looking for a possible systemic manifestation of a systemic disease. For example, systemic viral illnesses(e.g., measles and mononucleosis) can cause oral manifestations along with the systemic illness.
6. *Is there any historic reason for the lesion (e.g., trama to the area, a recent toothache)?* One of the first things the dentist should do when a lesion is discovered is seek an explanation based on the patient's history. frequently, lesions in and around the oral cavity are caused by habits, hard or hot foods, application of medicines not intended for topical use, and recent trauma. Additionally, the dentition should always examined very carefully when a lesion is found in I general area, because many such lesions have some relationship to the teeth.

Clinical Examination

When a lesion is discovered, it must be carefully examined for clues to its nature. Furthermore, a thorough examination of the areas around the lesion, including the regionnal_ lymph nodes, is mandatory. Once the examination is complete, a detailed description of the findings is placed in the patient's chart. It is very helpful to draw the lesion in the chart or on a schematic of the oral cavity and perioral area (Fig. 21-2). A description and illustration allow the dentist to follow the course of the lesion over time and to determine whether it is resolving or changing in nature.

An examination classically includes inspection, palpation, percussion, and auscultation. In the oral-maxillofacial region, inspection and palpation are the most commonly used diagnostic modalities, with percussion usually being reserved for examination of the dentition. Although auscultation is infrequently used, it is an important diagnostic tool when examining suspected vascular lesions. Inspection is *always* performed before palpation. which allows the dentist to describe the lesion before it is handled, because some lesions are extremely friable, fragile or both. Manipulation of such a lesion may precipitate hemorrhage or may rupture a fluid-filled lesion, which then makes accurate inspection more difficult. The following art some of the more important points to be evaluated:

1. *The anatomic location of the mass.* Lesions may arise from any tissue within the oral cavity, including epitheliun subcutaneous and submucosal connective tissue, muscle, tendon, nerve, bone, blood vessels, and salivar glands. The dentist should ascertain as much as possible which tissues are contributing to the lesion. The exaci anatomic location of the lesion should aid in this determination. For example, if a mass is present on the dc:-sum of the tongue, the dentist must consider an epithe-Hal, connective tissue, or muscle origin for the mas.: Similarly, a swelling on the inner aspect of the lower JT should prompt the dentist to include a salivary glare etiology in the differential diagnosis. Whenever a lesic: is discovered, the dentist should always try to elucici:-the cause of the lesion based on its anatomic locaticr: The role of trauma in the appearance of oral lesior should always be entertained (and a search for a source of trauma undertaken). Ill-fitting prosthetic device chronic cheek biting and other habits, sharp teeth, an; so on are common causes of oral lesions. Periapical and periodontal dental pathologic conditions also cause a high percentage of oral lesions.

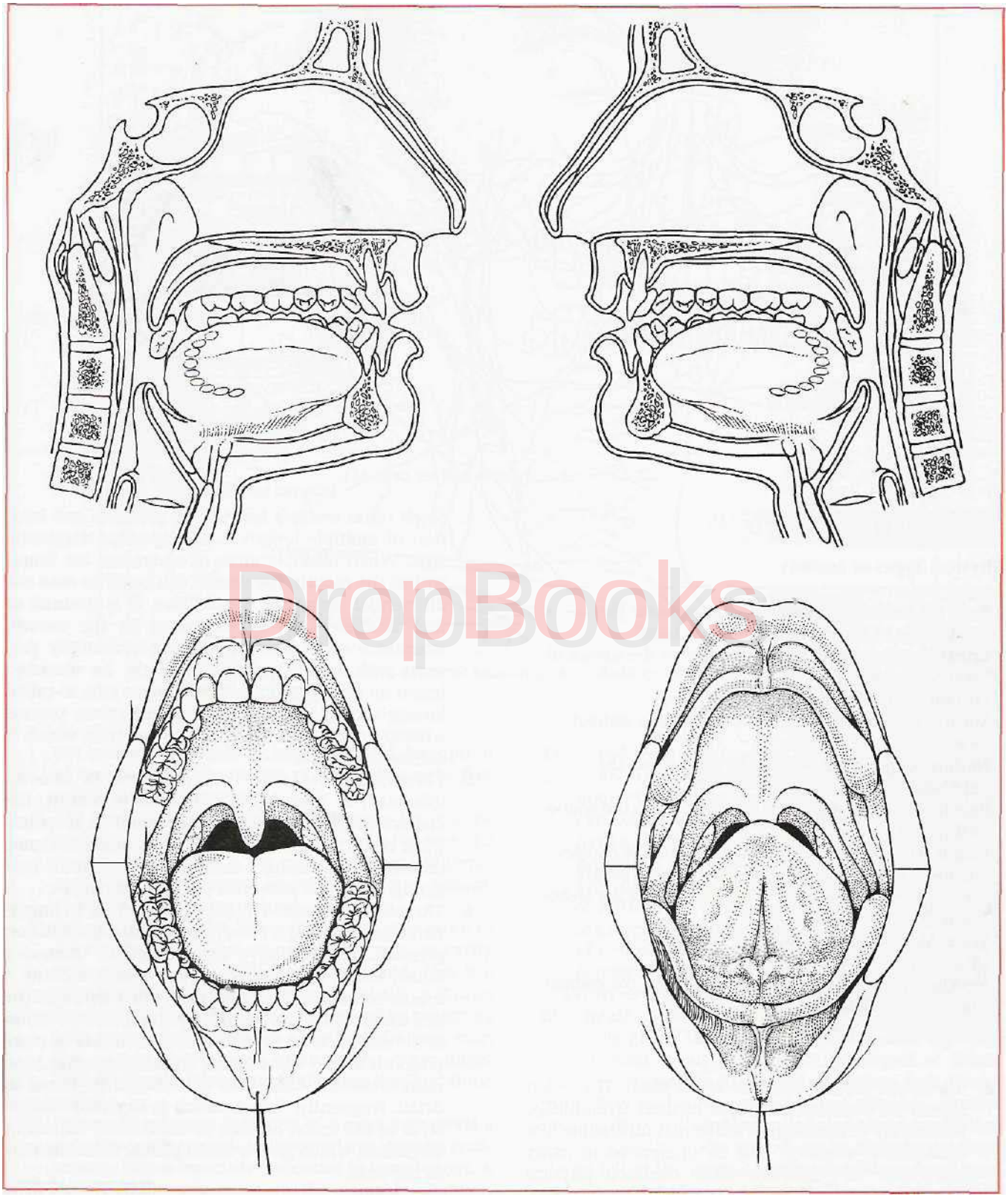

FIG. 21-2 Illustrations of oral cavity and perioral areas, which are useful for indicating size and location of oral

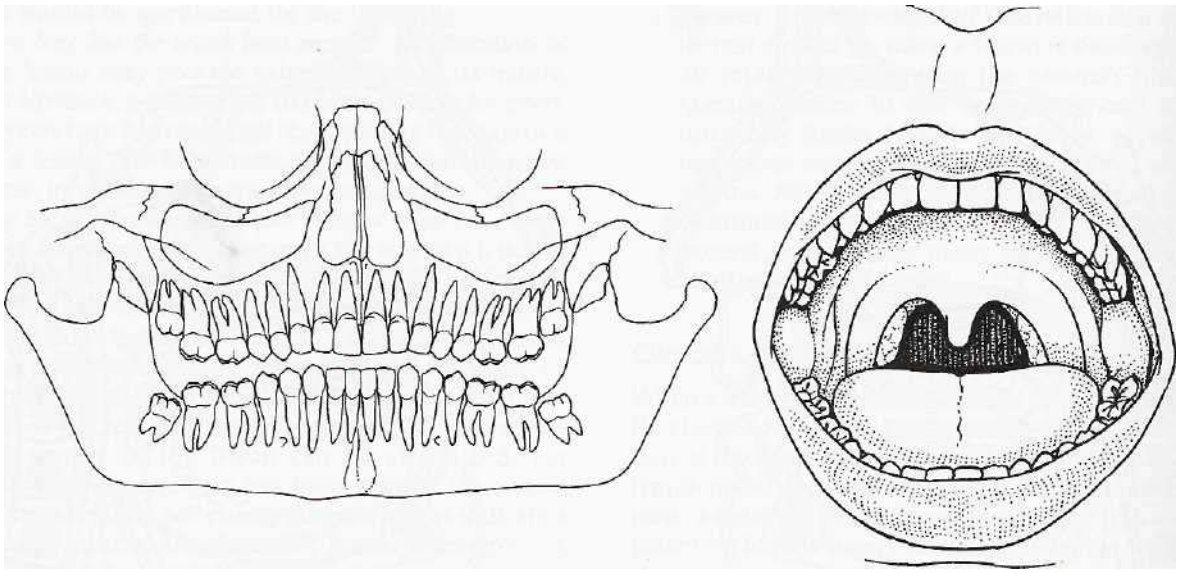

FIG. 21-2—cont'd For legend see page 461.

BOX 21-1

Physical Types of Lesions

Bulla (pl. bullae): Loculated fluid in or under the *epithelium of skin or mucosa; a large blister*
Crusts: Dried or clotted serum protein on the surface of skin or mucosa
Erosion: *Superficial ulcer (i.e., excoriation)*
Macule: Circumscribed area of color change without elevation
Nodule: *Large palpable mass, elevated above the* epithelial surface
Papule: Small palpable mass, elevated above the epithelial surface
Plaque: Flat elevated lesion; the confluence of papules
Pustule: Cloudy or white vesicle, the color of which *results from the presence of polymorphonuclear leuko*cytes (i.e., pus)
Scale: Macroscopic accumulation of keratin
Ulcer: *Loss of epithelium*
Vesicle: Small loculation of fluid in or under the epithelium; a small blister

The overall physical character of the lesion. The lesion should be described in proper medical terminology, because lay terminology is sometimes misleading. For example, a "swelling" may be interpreted in many ways. Box 21-1 lists the more common physical descriptions that are useful in describing oral pathologic entities. A lesion's physical characteristics should always be categorized as (at least) one of the several types of lesions listed.

The size and shape of the lesion. Accurate recordings of these two basic physical characteristics should be made for future reference.

Single versus multiple lesions. The presence and location of multiple lesions is an important diagnnostic sign. When multiple areas of ulceration are found within the mouth, the dentist can begin to rank the differential diagnostic possibilities. It is unusual to find multiple areas of carcinoma in the mouth, whereas a vesiculobullous disease commonly presents with such a pattern. Similarly an ulcerated lesion on the lip and tip of the tongue (the so-called kissing ulcers) may indicate an infectious process whereby one lesion infects the tissue with which it comes into contact.

The surface of the lesion. The surface may be smooth lobulated, or irregular. If ulceration is present, the characteristics of the ulcer base should be recorded Ulcer beds can be smooth; full of granulation tissue: covered with a slough, membrane, or scab; or fungating, such as is seen with some malignancies. *The color of the lesion.* The color or colors are an important consideration. A bluish swelling that blanches; pressure may indicate a vascular lesion, whereas a bluish lesion that does not blanch may indicate a mucus-containing lesion. A pigmented lesion of the oral mucosa may carry more importance than a lesion of normal color. An erythematous lesion may be more ominous than a white lesion. Some lesions may have more than one color, and this should be noted in detail. Frequently, inflammation is superimposed on areas of the lesion because of mechanical trauma or ulceration, which gives a varied picture from one time to the next.

The sharpness of the boundaries of the lesion. If a mass is present, is it fixed to surrounding deeper tissues or is it freely movable? The determination of the bound- aries will aid in establishing whether the mass is fixed to bone, arising from the bone and extending *into* soft tissues, or of an infiltrating nature. The same applies to an ulceration; however, a description of

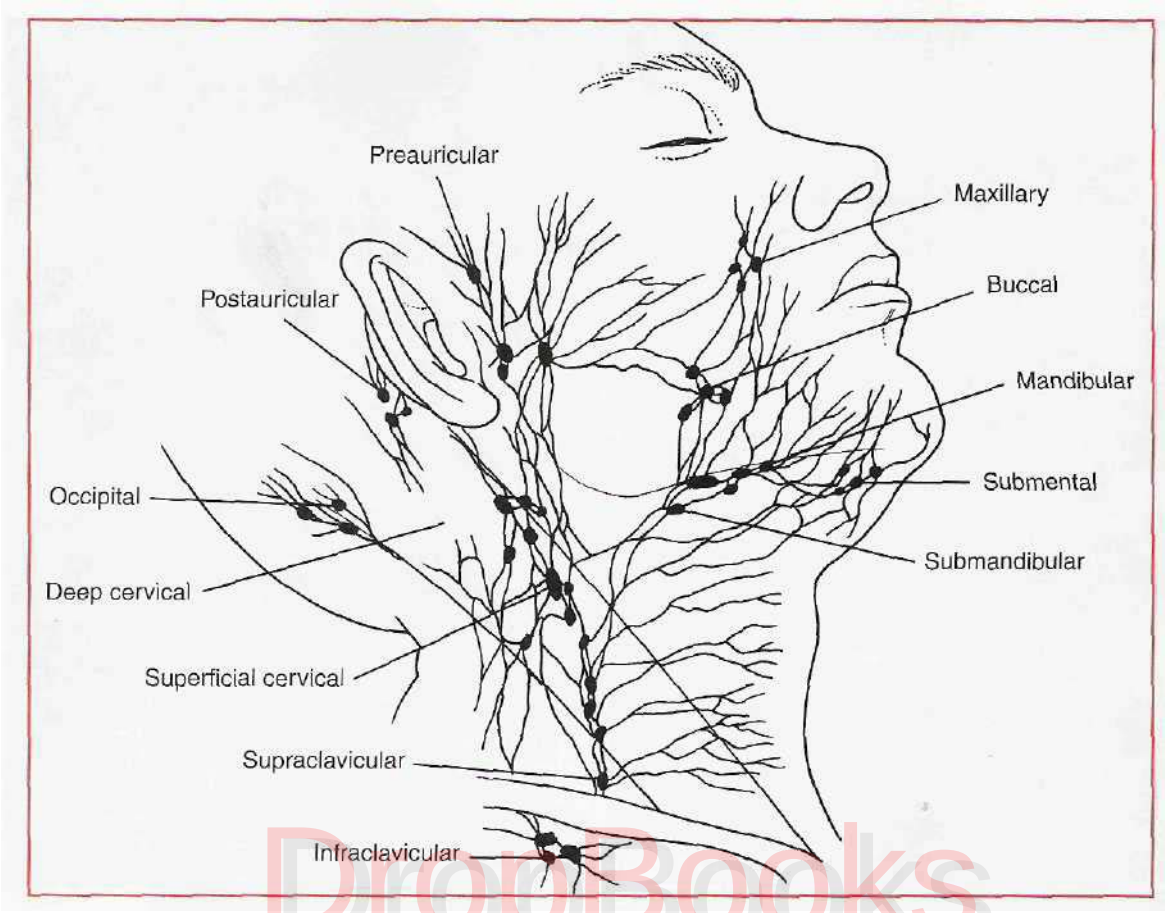

FIG. 21-3 A, Anatomic location of cervicofacial iymph nodes.

Continued

the boundaries should include a physical description of the margins. The margin of an ulcer may be flat, rolled, raised, or everted.

8. *The consistency of the lesion to palpation.* The consis tency of lesions is described as *soft,* as in the case of a lipoma; *firm,* which is the consistency of a fibroma; or *hard,* as in the case of an osteoma or tori. *Indurated* simply means firm or hard.
9. *Presence of fluctuation.* Fluctuation is the term given to a wavelike motion felt on palpating a mass or cavity with nonrigid walls, which contains fluid. This is a valuable physical sign, because it usually indicatesfluid within the mass. It can be elicited by palpating with two or more fingers in a rhythmic fashion,such that as one finger exerts pressure, the other finger feels the impulse transmitted through the fluid-filled cavity.
10. *Presence of pulsation.* Palpation of a mass may reveal a pulsatile quality, which indicates a large vascular component. This is especially important in bony lesions. A *thrill* is the name given to the palpable vibration accompanying a vascular murmur or pulsation. If a thrill is palpable, auscultation with a stethoscope may reveal a *bruit,* or audible murmur. Lesions with palpable thrills or audible bruits should be referred to a specialist for treatment, because life-threatening hemorrhage can arise when biopsy is attempted.
11. *Lymph node examination.* No evaluation of an oral lesion is complete without a thorough regional lymph node examination. Before *any* biopsy procedure, it is particularly important to perform a thorough examination of the regional lymph nodes. Sometimes lymphadenitis develops in regional nodes after a biopsy procedure. The enlargement of these nodes as a result of inflammation may pose a problem in differentiating infection or inflammation from metastatic spread of tumor. Fig. 21-3 illustrates the important and more common lymph nodes in the maxillofadal region. When recording findings the following five characteristics should routinely be included: (1) location; (2) size, preferably giving the diameter in centimeters; (3) tenderness (painful versus nonpainful); (4) degree of fixation (movable, matted, or fixed); and (5) texture (soft, hard, or firm). Normal lymph nodes are not palpable. However, nodes enlarge with inflammation and may be palpable as a result. Cervical nodes up to 1 cm in diameter are almost always felt in the cervical region of children up to age 12 and are not an abnormal finding. The standard examination of the lymph nodes requires only simple inspection and palpation. It is always useful to compare sides by using the middle three fingers for palpation. This examination is methodic and proceeds downward as follows: (1) occipital and postauricular; (2) submandibular and submental; (3) anterior cervical triangle (i.e., upper end of deep cervical

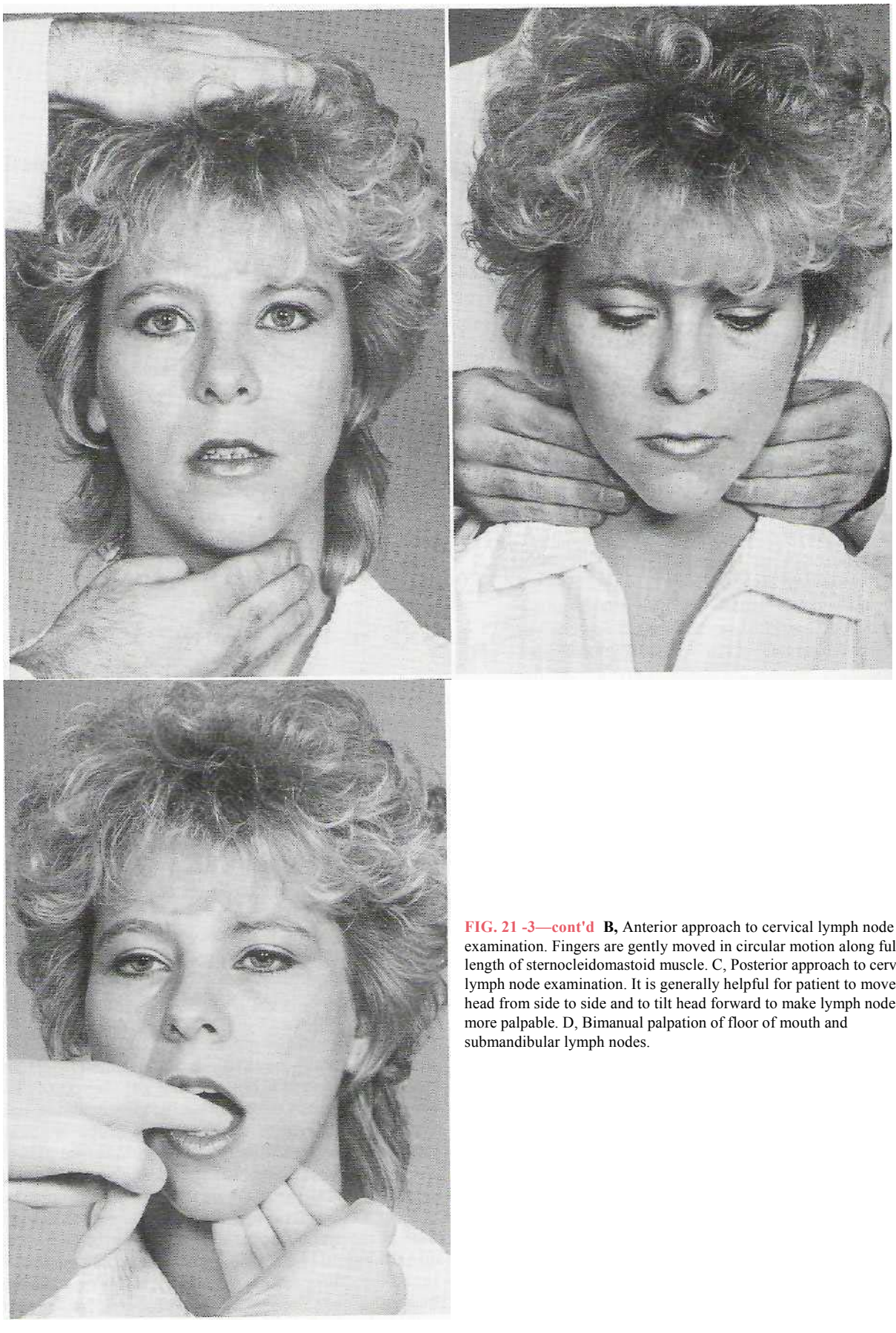

FIG. 21 -3—cont'd **B,** Anterior approach to cervical lymph node examination. Fingers are gently moved in circular motion along full length of sternocleidomastoid muscle. C, Posterior approach to cervical lymph node examination. It is generally helpful for patient to move head from side to side and to tilt head forward to make lymph nodes more palpable. D, Bimanual palpation of floor of mouth and submandibular lymph nodes.

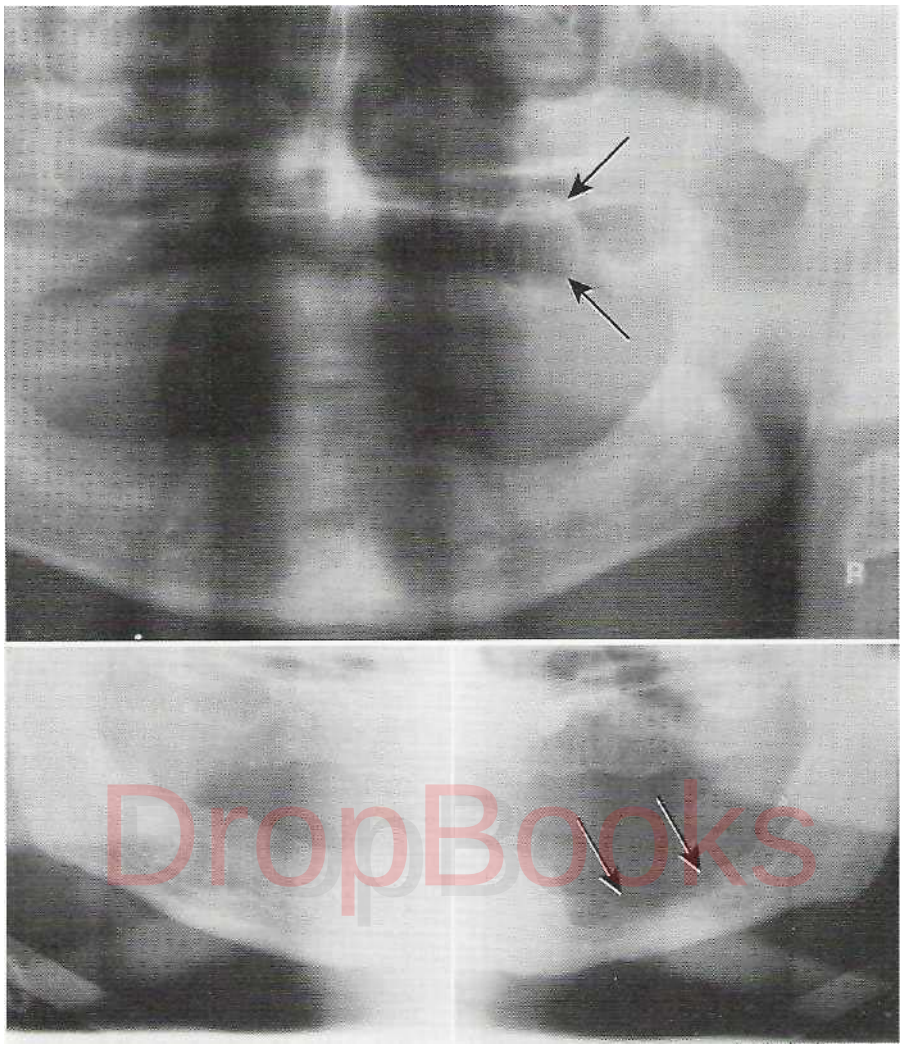

FIG. 21-4 A, Radiographic appearance of cyst *(arrows)*. Note peripheral condensing osteitis around radiolucent center. B, Radiographic appearance of bone destruction by malignancy *(arrows)*. Squamous cell carcinoma has eroded into mandible. Note ragged appearance

. chain); (4) downward along sternocleidomastoid muscle (i.e., superficial cervical nodes); (5) posterior triangle (i.e., lower end of deep cervical chain); and (6) supraclavicular. Movements during palpation should be slow and gentle; the fingers move across each area examined in vertical and horizontal directions followed by rotary motion.

Radiographic Examination

Radiographs are useful as diagnostic adjuncts to the clinical examination and history of lesions within or adjacent to bone. When lesions within the soft tissues are proximal to bone, radiographs may elucidate whether the lesion is causing an osseous reaction or eroding into the bone. A variety of radiographic projections may be used, depending on the anatomic location of the lesion. Most pathologic conditions of the mandible or maxilla can be satisfactorily demonstrated by routine radiography, but, occasionally, special imaging techniques are required to elucidate some particular facet of the case under investigation.

The radiographic appearance frequently gives clues to the true nature of a lesion. For example, a cyst usually appears as a radiolucency with sharp radiographic borders (Fig. 21-4, *A)*. Conversely, a ragged radiolucency may indicate a more aggressive lesion, such as a malignancy (Fig. 21-4, *B)*. Anytime an intraosseous lesion is suspected by radiographic evaluation, the dentist must always determine whether the lesion is in fact a normal anatomic structure. This is especially true in radiographs of the maxilla, in which the complex anatomy of the nasal and paranasal cavities can produce extremely misleading radiographic images.

In special instances, radiopaque dyes or instruments can be useful in conjunction with routine or special radiographs. Sialography, the injection of a radiopaque dye into the duct of a salivary gland to outline the ductal structures, can be used to provide an indirect image of the glandular architecture and any pathologic processes within it. Injection of a cyst with a radiopaque dye allows a much more accurate radiographic image of the true

BOX 21-2

Indications for Biopsy

- Any lesion that persists for more than 2 weeks with no apparent cause
- Any inflammatory lesion that does not respond to local treatment after 10 to 14 days (after removing local irritant)
- Persistent hyperkeratotic changes in surface tissues
- Any persistent tumescence, either visible or palpable beneath relatively normal tissue
- Inflammatory changes of unknown cause that persist for long periods
- Lesions that interfere with local function (e.g., fibroma)
- Bone lesions not specifically identified by clinical and radiographic findings
- Any lesion that has the characteristics of malignancy (Box 21-3)

BOX 21-3

Characteristics of Lesions that Raise Suspicion of Malignancy

Erythroplasia: Lesion is totally red or has a speckled red and white appearance
Ulceration: Lesion is ulcerated or presents as an ulcer
Duration: Lesion has persisted more than 2 weeks
Growth rate: Lesion exhibits rapid growth
Bleeding: Lesion bleeds on gentle manipulation
Induration: Lesion and surrounding tissue is firm to the touch
Fixation: Lesion feels attached to adjacent structures

extent of the cyst. Radiopaque probes (i.e., needles) can be used to localize

Laboratory Investigation

Several oral lesions may be manifestations of systemic diseases. For instance, multiple lyric lesions and loss of lamina dura bone suggest the possibility of hyperparathyroidism. Serum levels of calcium, phosphorus, and alkaline phosphatase should identify this metabolic abnormality. A patient with multiple radiolucencies of the jaws or other bones may also have multiple myeloma. Serum protein analysis can be useful for identifying this disease process.

In most instances laboratory investigations are unnecessary in evaluation of oral lesions, because they generally are low yield and nondiagnostic for most oral lesions, and because biopsy yields more accurate results. They play an important role, however, once a biopsy yields a tissue diagnosis of a tumor, such as central giant cell granuloma.

This histologic picture may be the result of a solitary nonsystemic lesion or of hyperparathyroidism. In this instance the dentist should determine serum calcium, phosphorus, and alkaline phosphatase levels to rule out the possibility that the lesion is an oral manifestation of a systemic disease.

Surgical Specimen for Pathologic Examination

Once the preceding steps have been accomplished, the dentist should compile a differential diagnosis. In most instances the data obtained from the history and the clinical and radiographic examinations provide enough. information for a tentative diagnosis. Lesions that appear traumatic in origin may be initially treated nonsurgically by elimination of any continued source of irritation (e.g. relieve or reline dentures, smooth a sharp tooth or appliance). Observation for 10 to 14 days will verify the presumptive diagnosis in these cases; that is, the lesion should heal if trauma is a cause.

When these steps have not provided an accurate diagnosis of a lesion that is thought to be nontraumatic in origin, observation of the lesion for 7 to 10 days may be prudent, unless the clinician strongly suspects significant disease. The patient should be *closely* examined initially, with accurate recording of the exact size and characteristics of the lesion. Comparison at the later date indicates. whether improvement has occurred. If no improvement in the lesion is obvious, obtaining tissue for histopathologic analysis is the next and most definitive step. Lesions on which biopsies should be performed are listed in Box 21-2. The typical characteristics of lesions that should raise the clinician's suspicion of malignancy are listed in Box 21-3.

PRINCIPLES OF BIOPSY

Biopsy is the removal of tissue from a living individual for diagnostic examination. It is the least equivocal (most diagnostic) of all the diagnostic procedures performed in the laboratory and should be carried out whenever a definitive diagnosis cannot be obtained using less invasive diagnostic modalities. The four major types of biopsy in and around the oral cavity are (1) cytology, (2) aspiration biopsy, (3) incisional biopsy, and (4) excisional biopsy.

Oral Cytology

Two main forms of oral cytology can be used in clinical practice—-differing in the method of cellular collection and in diagnosis: The first is *exfoliative cytologic* examina-tion for tumor cells, which was first described as a diag- nostic procedure for detection of uterine cervical mall-gnancy. Although application to the oral cavity has been advocated, it should be used as an adjunct to, not a substitute for, incisional or excisional biopsy. Studies have shown exfoliative oral cytology to be unreliable (i.e.. having an unacceptable number of false negatives), especially when pathologists who lack expertise in oral cytology examine the specimen.

The second form, oral brush biopsy (or more appropri ately, *oral brush cytology),* is a recent development that is being heavily marketed to dentists. Oral brush cytology uses a special brush to collect the epithelial cells (Fig,

21-5, *A)*. Studies have shown this technique to be superior to exfoliative oral cytology.[1]-[2] In the United States a multicenter clinical trial of close to 1000 patients was conducted at 35 academic dental centers using oral brush biopsy.[2] The outcome showed oral brush biopsy to be very precise—independently detecting 100% of histologically confirmed oral precancers and cancers (statistically significant sensitivity >96%, p <0.05, n- 131).

Furthermore oral brush cytology uncovered precancer or cancer among 4.5% of clinically benign-appearing lesions that would not have received additional testing or attention other than clinical follow-up and which experienced academicians judged to be harmless in appearance.

Technique of oral brush cytology. The brush is placed in contact with oral epithelium and rotated with firm pressure 5 to 10 times (Fig. 21-5, *B)*. Properly performed, the brush collects cells from all three layers of the epithelium: (1) the basal, (2) intermediate, and (3) superficial layers. The cellular material collected on the brush is transferred to a glass slide and flooded with fixative (Fig. 21-5, C). After the slide is dry, it is sent to a special laboratory where the specimen is evaluated by both a computer system and a pathologist to first determine that the biopsy brush has penetrated to the basement membrane. If the biopsy has not collected cells from the full thickness of the epithelium, the dentist will be informed that the sample was inadequate for analysis. The brush cytology should then be repeated.

If the sample is adequate, a computer that is specifically programmed to detect oral epithelial dysplastic and malignant cells scans each brush cytology specimen. Images of abnormal cells identified by the computer system are individually displayed on a high-resolution, color video monitor and reviewed by pathologists who are specially trained in computer-assisted analysis of ora] brush biopsies.

The pathologist classifies the oral brush cytology specimen into one of three categories: (1) negative, (2) positive, and (3) atypical. A "negative" result indicates that no epithelial abnormality was detected. Oral lesions with negative results require the same clinical follow-up as negative histologically sampled lesions. A result that is "positive" indicates that definitive cellular evidence of epithelial dysplasia or carcinoma is present. If a result is positive, the patient should always be referred for scalpel biopsy and histology to grade and stage the lesion. A result that is "atypical" indicates that abnormal epithelial changes are present. These abnormal cells originate most often from a precancerous or cancerous lesion, although they may also develop in a benign inflammatory lesion such as lichen planus. Therefore all atypical results require referral for scalpel biopsy and histology.

Indications. Oral brush cytology may be a good tool for "monitoring" patients with chronic mucosal changes, such as leukoplakia, lichen planus, postirradiation, and patients with a history of oral cancer who require long-term surveillance of their ongoing mucosal changes. The greatest advantage in oral cytology is that it is a chair side test that does not require any topical or local anesthesia and results in minimal discomfort or bleeding. It takes only seconds to perform, and it may therefore be used with more frequency than one might perform or refer for

FIG. 21-5 Technique of oral brush cytology. A, Brush that is used to obtain specimen. B, Brush contacts tissue in area where cells are desired and is rotated 5 to 10 times with moderate pressure. C, The cells are then transferred to a microscopic slide and a fixative is applied.

standard incisional or excisional biopsy. Rather than simply "observing" a suspicious lesion, one can readily obtain a sample of cells for analysis.

Oral cytology should serve as a trigger and not a substitute for traditional scalpel biopsy and histology. This is because the tissue specimen in brush-accumulated cytol-

ogy is disaggregated. As such, the architectural information necessary to stage and grade the lesion is absent. Only the histologic analysis of a scalpel biopsy can provide this information. Therefore all oral lesions with abnormal brush cytology results, that is, those that are "positive" and "atypical," require scalpel biopsy and histologic evaluation to characterize the lesion completely.

Aspiration Biopsy

Aspiration biopsy is the use of a needle and syringe to penetrate a lesion for aspiration of its contents. Two main types of aspiration biopsy are used in clinical practice: The first is used only to determine whether or not a lesion contains fluid or air; the second is used to remove cellular material for diagnostic examination by a pathologist. The latter technique is usually performed by a pathologist trained in the technique of *fine needle aspiration* (FNA). Patients are frequently referred to pathologists for FNA when a soft tissue mass is detected below the surface of the skin or mucosa during clinical examination. The pathologist uses a special syringe and needle to enter the mass and collect cells for histologic examination. Neck masses can be reliably diagnosed using this technique. Because deep masses are difficult to biopsy, FNA biopsy is a very powerful tool.

Aspiration of a lesion to determine whether or not it contains fluid is done routinely before opening into radiolucent lesions of the jaws. Inability to aspirate fluid or air indicates that the mass is probably solid. Aspiration of a lesion can yield extremely valuable information about its nature. A radiolucent lesion in the]aw that yields straw-colored fluid on aspiration is most likely a cystic lesion. If pus is aspirated, an inflammatory or infectious process should be considered (i.e., abscess). Air on aspiration may indicate that a traumatic bone cavity has been entered. Blood on aspiration could represent several lesions, the most important of which is a vascular malformation in the jaw. However, other vascular lesions may produce blood on aspiration. Aneurysmal bone cysts, central giant cell granulomas, and other lesions can produce a bloody aspirate. A fluctuant mass in the soft tissues should also be aspirated to determine its contents before definitive treatment. *Any* radiolucency in the bone of the jaws should be aspirated before surgical intervention to rule out a vascular lesion that could result in life-threatening hemorrhage if incised. Material obtained by aspiration can be submitted for pathologic examination, chemical analysis, or microbiologic culturing.

Indications. Aspiration should be carried out on all lesions thought to contain fluid (with the possible exception of a mucocele) or any intraosseous lesion before surgical exploration.

Technique. An 18-gauge needle is connected to a 5- or 10-ml syringe. The area is anesthetized and the 18-gauge needle inserted into the depth of the mass during aspiration. The tip of the needle may have to be repeatedly repositioned in an effort to locate a fluid center. For intraosseous lesions, if expansion and thinning of the cortical plates has occurred, the needle may be firmly applied directly through mucoperiosteum to the bone and twisted until it perforates the cortical plate. If this fails, a small mucoperiosteal flap may be elevated and a bur used to penetrate the cortical plate. The needle is then advanced through the cortical hole.

Incisional Biopsy

An incisional biopsy is a biopsy that samples only a particular or representative part of the lesion. If the lesion, is large or has different characteristics at different locations, more than one area of the lesion may require sampling.

Indications. If the area under investigation appears difficult to excise because of its extensive size (i.e., larger than 1 cm in diameter), hazardous location, or whenever the clinician suspects malignancy, incisional biopsy is indicated.

Principles. A biopsy in wedge fashion should be performed on representative areas of the lesion. The biopsy site should be selected in an area that shows complete tissue changes (the lesion extends into normal tissue at the base or margin [or both] of the lesion). Necrotic tissue should be avoided, because it is useless in diagnosis. The material should be taken from the edge of the lesion to include some normal tissue. However, care must be taken to include an adequate amount of abnormal tissue. It is much better to take a deep, narrow biopsy rather than a broad, shallow one, because superficial changes may be quite different from those deeper in the tissue.

Excisional Biopsy

An excisional biopsy implies removal of the entire lesion at the time the surgical diagnostic procedure is performed. A perimeter of normal tissue surrounding the lesion is also excised to ensure total removal. The entire lesion made available for pathologic examination, and complete excision may constitute definitive treatment.

Indications. Excisional biopsy should be used with smaller lesions (less than 1 cm in diameter) that on cilnical examination appear to be benign. Any lesion that can be removed completely without mutilating the patient is best treated by excisional biopsy. Pigmen:ec and small vascular lesions should also be removed in their entirety.

Principles. The entire lesion, along with 2 to 3 mm of normal-appearing surrounding tissue, is excised.

SOFT TISSUE BIOPSY TECHNIQUE AND SURGICAL PRINCIPLES

Oral soft tissue biopsy is a technique that every dentist should be competent to perform. Performed properly, it is a simple and painless procedure that can be done quickly in the dental office with common, simple instrumentation (Box 21-1). The entire oral mucosa is amenable to biopsy, and the technique only differs according to local anatomy and the size and type of lesion.

The surgical principles presented in Chapter 3 apply to biopsy technique, as well as to any other surgical procedure within the oral cavity. These principles are briefly outlined in the following sections.

BOX 21-4

Armamentarium for Biopsy

Instruments for Soft Tissue Biopsy
- Local anesthetic equipment
- Scalpel (no. 15 blade)
- Scissors with pointed tips
- Fine tissue forceps
- Small hemostat
- Gauze sponges (suction, if necessary)
- Needle holder, needle, and suture
- Biopsy bottle containing 10% formalin
- Biopsy data sheet

Additional Instruments for Hard Tissue Biopsy or Biopsy of Soft Tissue within Bone
- Periosteal elevator
- Rongeur
- Bur and rotary handpiece
- Sterile saline irrigation
- Curettes

Instruments for Aspiration of Intraosseous Lesion
- Syringe (5 or 10 ml)
- Needle (18 gauge)

Anesthesia

Block local anesthetic techniques are used when possible. The anesthetic solution should not be injected within the tissues to be removed, because it can cause artifactual distortion of the specimen. When blocks are not possible, infiltration of local anesthetic may be used, but the solution should be injected at least 1 cm away from the lesion (i.e., field block).

Tissue Stabilization

Soft tissue biopsies in the oral cavity are frequently performed on movable structures, such as the lips, soft palate, and tongue. Accurate surgical incisions are easiest to perform on tissues that are properly stabilized. Several methods are available in the dental office to achieve tissue stabilization. An assistant's fingers pinching the lip on both sides of the biopsy area can immobilize the lips (Fig. 21-6, *A)*. This method also aids in hemostasis by compressing the labial arteries. Instruments are available to perform this same function (Fig. 21-6, *B)*. Heavy retraction sutures or towel clips can be used to aid immobilization of the tongue or soft palate (Fig. 21-6, C). When used, the sutures should be placed deeply into the substance of the tissue, away from the proposed biopsy site. In this way they will be useful for secure stabilization, without pulling through the tissue.

Hemostasis

The use of a suction device for aspiration of surgical hemorrhage during biopsy should be avoided. This is especially true of the high-volume evacuators available in most dental offices. Small surgical specimens can be easily aspirated into these devices and lost. Gauze wrapped over the tip of a low-volume suction device or simple gauze compresses are adequate in most cases, unless severe hemorrhage is encountered.

Incision

A sharp scalpel should be used to incise tissues for biopsy. The use of electrosurgical equipment is much less desirable. This equipment causes destruction of tissue adjacent to the incision line and may distort the histologic architecture of the specimen. The use of a carbon dioxide laser in the super-pulsed mode with a small, well-focused beam can be used, but the clinician must realize that there will be a thin zone of necrosis from the laser. The advantage of using a laser is that hemostasis is immediately achieved. Two incisions forming an ellipse at the surface and converging to form a V at the base of the lesion provide a good specimen and leave a wound that is easy to close (Fig. 21-7).

Modification of the size of the ellipse and the convergence of the *V* portion of the incisions depend on the suspected depth of the lesion. Palpation gives clues to the size of the lesion beneath the mucosa. In excisional biopsies the initial incisions should be gauged to exceed the total depth of the lesion slightly. In incisional biopsies the depth into the lesion that provides sufficient material for histopathologic evaluation is adequate. Thin, deep specimens are preferable to broad, shallow specimens (Fig. 21-8). An attempt should be made to keep incisions parallel to the normal course of nerves, arteries, and veins. This will preclude, as much as possible, their injury. A periphery of normal-appearing tissue should be included in excisional biopsy specimens. If the lesion appears benign, 2 to 3 mm of peripheral tissue is adequate. If the lesion appears malignant, pigmented, vascular, or with diffuse borders, 5 mm of peripheral tissue should be submitted with the specimen. More than one incisional biopsy may be necessary if the lesion's characteristics vary from one area to another (Fig. 21-9).

Handling of Tissue

Any tissue specimen removed must be in a condition that readily lends to histopathologic examination. Crushed specimens may be nondiagnostic and only delay definitive diagnosis and therapy because of the necessity of performing a repeat biopsy. Extreme care must be exercised when removing the surgical specimens. Liberal use of tissue forceps on the specimen will severely damage the cellular architecture, especially in small biopsies. Once a tissue forceps is applied to the specimen, repeated releasing and replacing of the instrument should be avoided. The use of a traction suture through the specimen is an excellent method for avoiding specimen trauma (Fig. 21-10).

Identification of Surgical Margins

When anything but a benign process is suspected, the clinician should mark the margins of the biopsy speci-

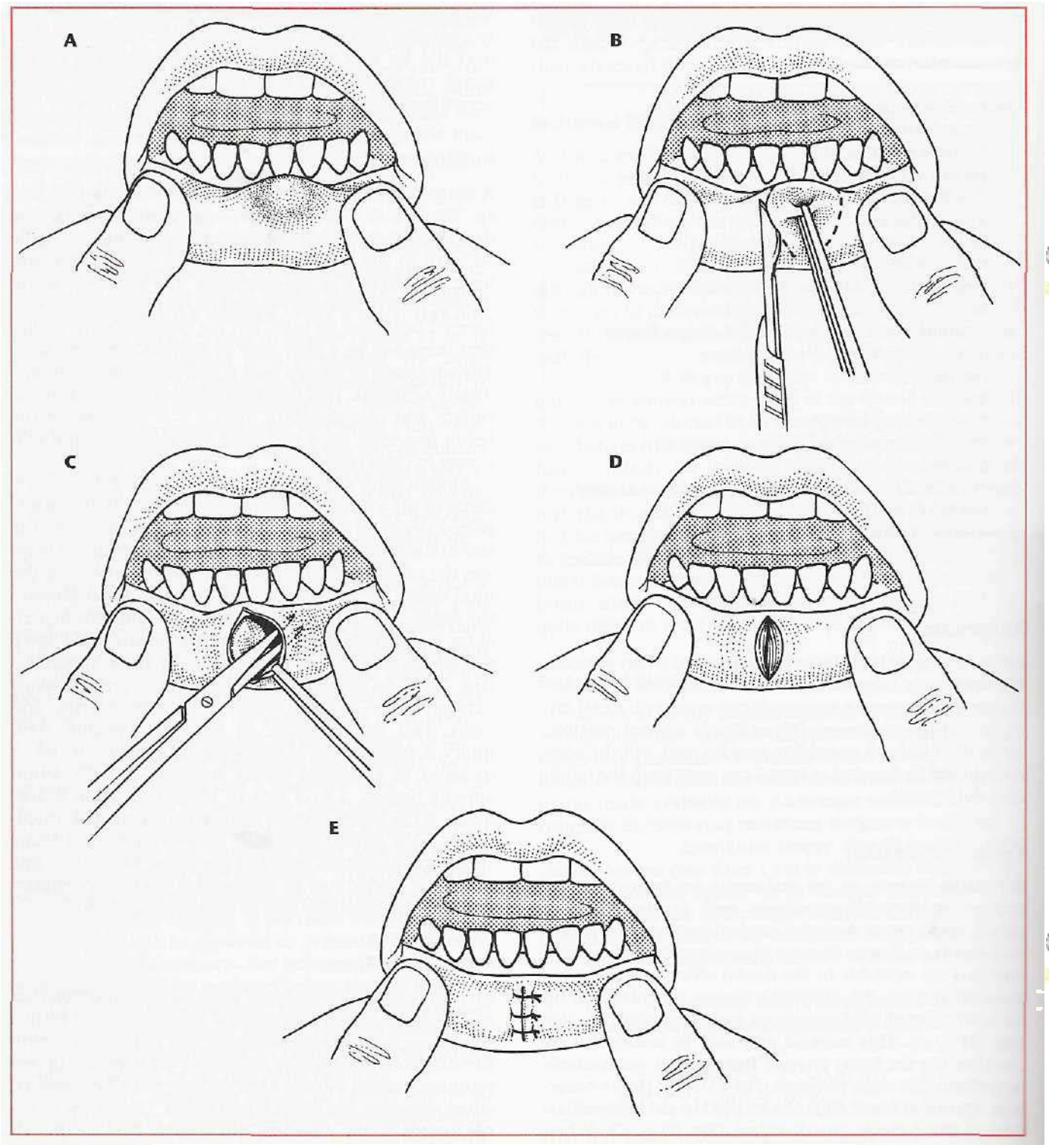

FIG. 21-6 A, Assistant's fingers used to stabilize tissue before excisional biopsy of mucocele. B, Elliptic incision is made around lesion. C, Surgeon makes a submucosal excision of associated minor salivary glands. D and E, Mucosa is undermined and closed.

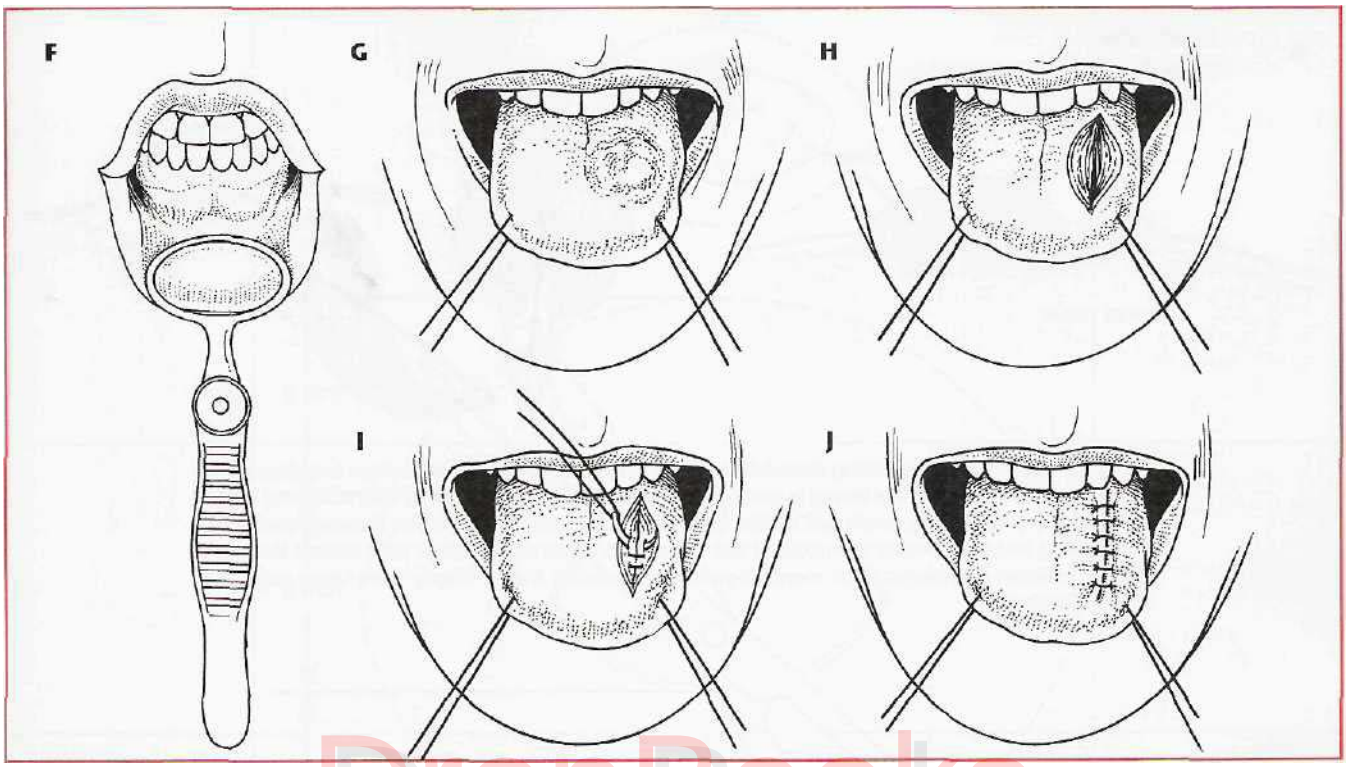

FIG. 21-6—cont'd F, Stabilization of tissue with mechanical device. C, Stabilizaticn of tissue with traction sutures. Two silk sutures are used to stabilize tongue before excisional biopsy. They are placed through substance of tongue (both mucosa and muscle) to prevent pulling through tissue. H, Lesion is removed after elliptic incision was made around it. i, Resorbable sutures are placed to approximate muscle. J, Mucosa is closed.

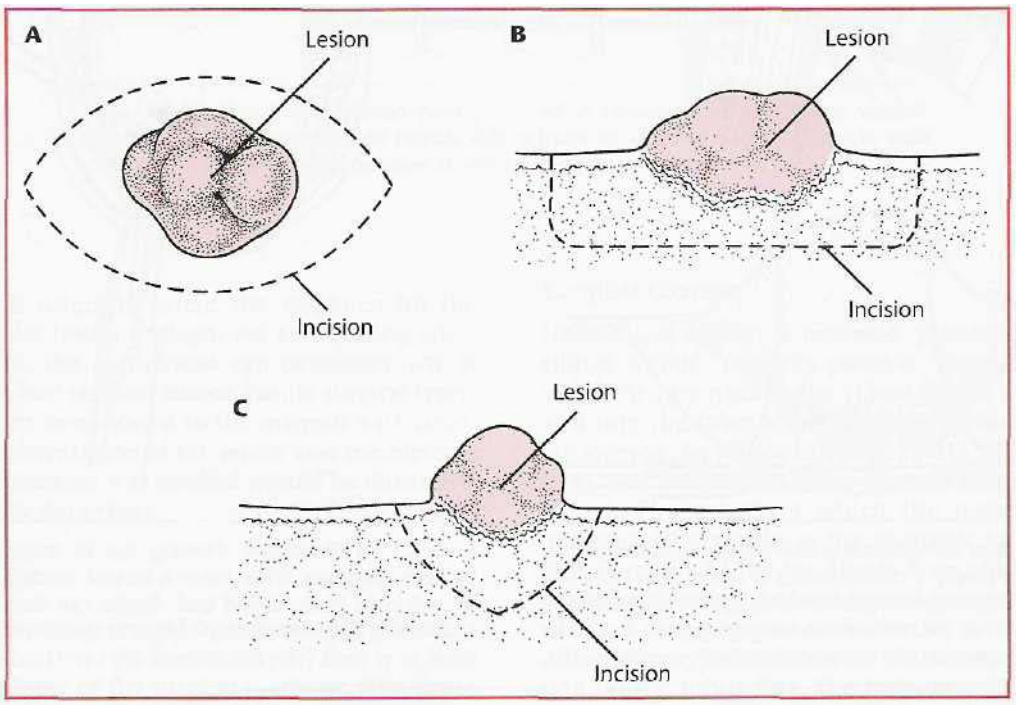

FIG. 21-7 Illustration of excisional biopsy of soft tissue lesion. **A**, Surface view. Elliptic incision is made around lesion . A, Surface view. Elliptic incision. B, Side view, Incision is made deep enough to remove lesion completely. C, End view. Incision are made convergent to depth of wound. If excision is made in this way, closure will be facilitated.

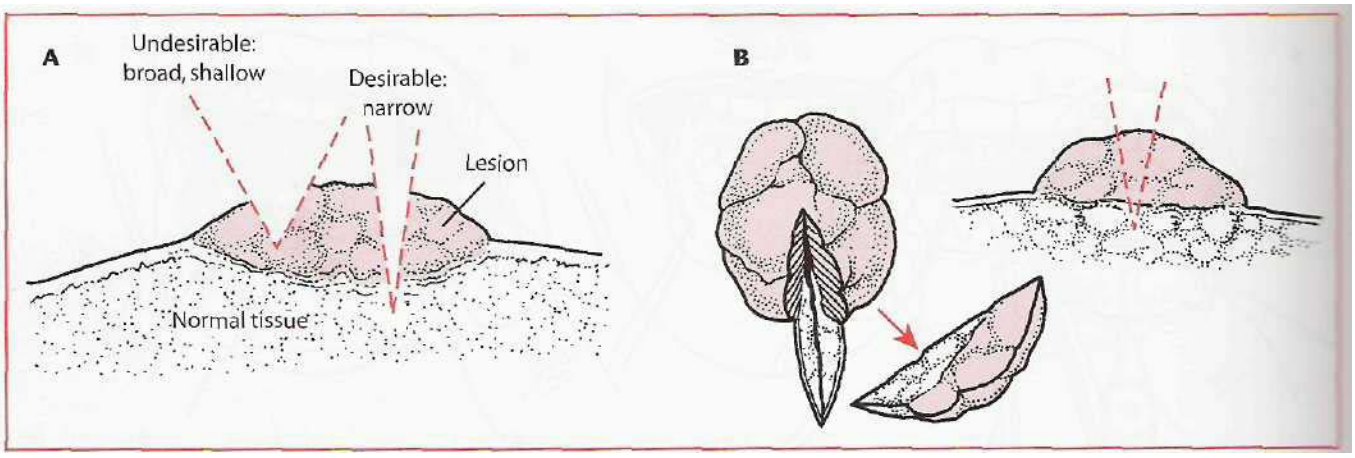

FIG. 21-8 A, Illustration showing desirability of obtaining deep specimen rather than broad and shallow specimen when incisional biopsy is performed. If malignant cells are present only at base of lesion, broad and shallow biopsy might not obtain these diagnostic cells. B, Illustration showing desirability of obtaining incisional biopsy at margin of soft tissue lesion. Junction of lesion with normal tissue frequently provides pathologist with more diagnostic information than if biopsy were taken only from center of lesion.

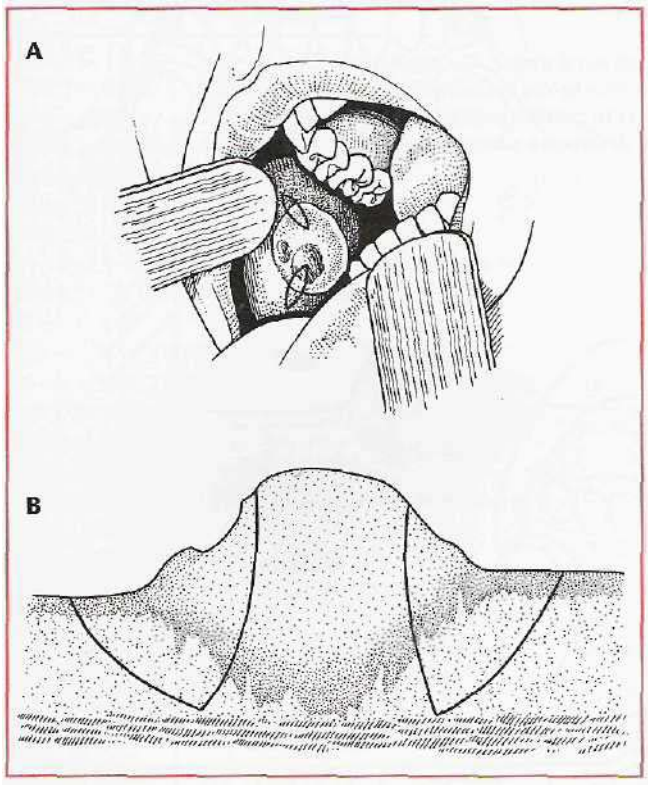

FIG. 21-9 Illustration demonstrating desirability of obtaining more than one incisional biopsy if characteristics of lesion differ from one area to another. Frequently one area of lesion appears histologically different from another (A). When obtaining biopsy on buccal or labial mucosa, incision is usually carried to depth of musculature (B).

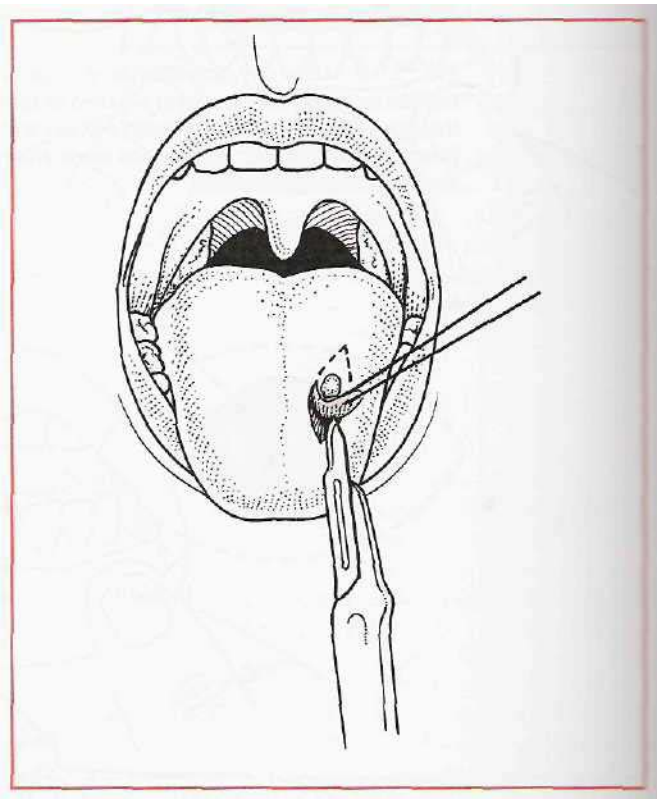

FIG. 21-10 Illustration showing use of traction suture piaced through specimen. While lesion is incised, traction suture is use to lift specimen from wound bed. Suture can then be tied and left attached to lesion to identify margin of specimen.

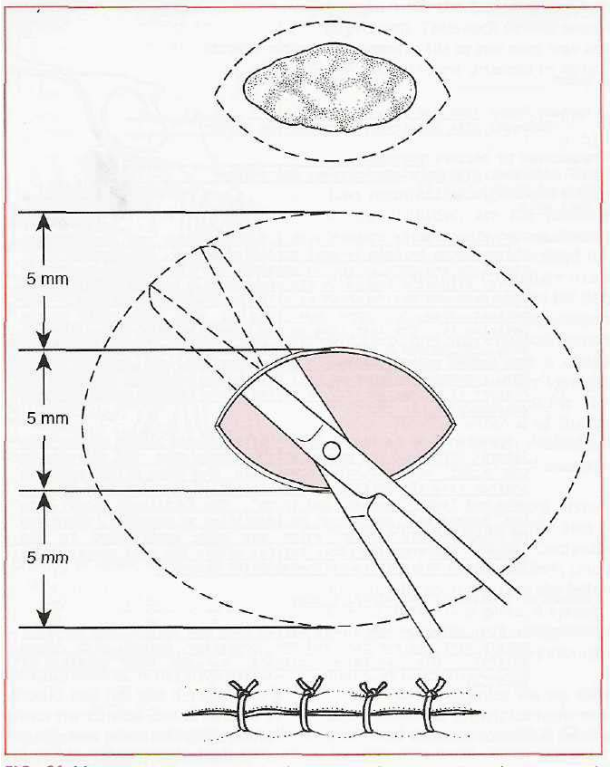

FIG. 21-11 Illustration showing principles used in closing an elliptic biopsy wound. Mucosa should be undermined biuntly with scissors to width of original ellipse in each direction. This allows approximation of wound margins without tension.

men with a silk suture to orient the specimen for the pathologist. If the lesion is diagnosed as requiring additional treatment, the pathologist can determine which margins, if any, had residual tumor. Future surgical intervention can then be confined to the margins with residual tumor. The orientation of the lesion and the method by which the specimen was marked should be illustrated on the pathology data sheet.

Specimen Care

After removal the tissue should be immediately placed in 10% formalin solution (4% formaldehyde) that is at least 20 times the volume of the surgical specimen. The tissue *must* be immersed in the solution, and care should be taken to be sure that the tissue has not become lodged on the wall of the container above the level of the formalin. Wound closure can then proceed.

Surgical Closure

Once the specimen is removed, primary closure of the elliptic wound is usually possible. The mucosa is undermined first by placing the closed tips of pointed scissors well into the submucosal area and spreading the tissues by opening the scissor tips (Fig. 21-11). The submucosa is loose tissue that allows the mucosa to be easily undermined. The extent to which the margins should be undermined depends on the anatomic location and size of the wound. In the lip, cheek, floor of mouth, and soft palate, undermining of the wound margins by at least the width of the ellipse *in each direction* is easily performed and allows approximation of the tissues with little tension on the suture line. The incision is then closed with just enough sutures to obtain primary closure. Elliptic incisions on attached mucosal surfaces, such as gingiva and palate, are not closed but rather allowed to heal by secondary intention. Periodontal dressings can be applied

YOUR LOCAL BIOPSY SERVICE
999 City Ave.
Anytown, USA 90909

Date: _____

Patient Name: John Doe
Address: 1234 Anystreet, Anytown, USA 90909

Submitted by Doctor: Toothache
Address: 6789 Anyroad, Anytown, USA 90909
Date of Birth: 7-17-53 Occupation: plumber
Sex: male Race: white

History: 29 yr. old white plumber with 2 month history of asymptomatic white plaque on left lateral border of tongue. He noticed it at that time and came in for an examination. It was observed for 2 weeks without a change in its appearance. An incisional biopsy was taken and was reported as mild epithelial dysplasia. The patient does not know how long it was there prior to his noticing it. The last time he saw a dentist was several years ago. He denies a history of smoking, drinking, oral habits and has had no recent changes in his activities. He cannot recall any traumatic episode or oral pain. The patient's past medical history is unremarkable. He claims there are no other lesions elsewhere on his body.

Clinical Appearance of Lesion: A 3x5cm white, ragged plaque on the left lateral border of the tongue which extends onto the dorsum in one area, and slightly down onto the floor of the mouth in another (see illustration). The lesion is not ulcerated in any area and feels "leathery and tough". The incisional biopsy site has healed well and cannot be identified at present. There are no local factors apparent which may have contributed to the lesion. There are no other lesions within the oral cavity or on the skin. There is no lymphadenopathy present.

Nature of Treatment: Excisional biopsy

Comments: The anterior margin is marked with one suture, the superior margin with two sutures, and the posterior margin with three sutures. One centimeter clinical margins were obtained at surgery.

FIG. 21-12 A, Biopsy data sheet. Such sheets vary fro m one laboratory to the next; the one listed here represents several. Information provided on this data sheet describes lesion shown in Figure 21-13.

Continued

to large wounds of the gingiva or palate for patient comfort and to promote healing. Frequently, palatal biopsies of any size are best managed postoperatively with the use of an acrylic splint, which can be secured to adjacent teeth once it has been lined with a dressing. Biopsy wounds on the dorsum or lateral border of the tongue require sutures to be placed *deeply* and *at frequent intervals* into the substance of the tongue to retain closure (see Fig. 21-6, C). The constant movement of the tongue makes suture retention difficult.

Biopsy Data Sheet

All specimens must be carefully labeled and identified with demographic data of both the patient and the dentist's office on a biopsy data sheet (Fig. 21-12). The pathology laboratory will supply the dentist with specimen bottles and the biopsy data sheet. All pertinent history and a clinical description of the lesion must be conveyed to the pathologist on this form. Because radiographs of the lesion are useful to the pathologist when dealing with hard tissue lesions, the dentist should submit a copy of them along with the specimen. Inadequate information can waste time and lead to inaccurate diagnoses. The pathologist should receive as much assistance as possible from the dentist to arrive at a diagnosis based on complete data. A complicated biopsy with margin identification or the obtaining of multiple biopsies should be noted carefully. The lesion margins and the location from which the specimen was obtained are identified on the illustratetion (Fig. 21-13). Each specimen should be sent in its c properly labeled bottle.

Once the biopsy has been performed, the dentist should make a follow-up appointment with the patient for 10 days to 2 weeks after surgery. Most pathology laborato es will have the report of a soft tissue biopsy back in this time. The surgical site can be examined at the follow-up appointment, and the report can be discussed with the patient.

It should be emphasized that the final diagnosis should correspond to the clinical course before ***and*** afte*r*. biopsy. If the lesion that was reported as benign is suspect.

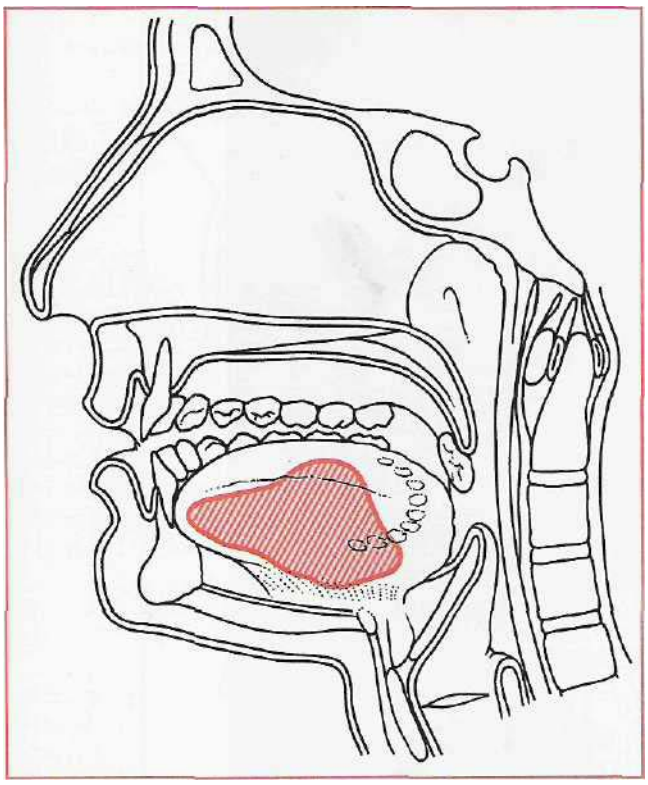

FIG. 21-12—cont'd B, Drowing of the lesion, whish is to be sent with data sheet.

clinically as if it were malignant, the dentist should search for further information. A negative pathology report for cancer should not lull the dentist into a false sense of security when the clinical characteristics of the lesion still indicate malignant potential. *If the pathology report does not corroborate the clinical impression of the lesion, the biopsy procedure should be repeated.* The area biopsied may have been nondiagnostic or nonrepresentative of the entire lesion, or the pathologist may have been unfamiliar with the appearance of oral lesions. Clinicians should always keep in mind that a pathologist's report can be in error. General pathologists unfamiliar with oral tissues may read several types of benign oral pathologic conditions as malignant, which is why many head and neck surgeons repeat the biopsy procedure of oral lesions before performing ablative surgery. The second specimen is sent to a pathologist who has expertise in oral pathology. It is important that the dentist completely understand the terminology in the pathology report. If unsure or unfamiliar with any terminology, the dentist should contact the pathologist to discuss the findings.

A reported diagnosis of cancer should be handled definitively but very carefully. It is the dentist's responsibility to refer the patient to another clinician or a treatment center for definitive therapy. This referral is an important step, and the dentist must make the patient aware of the significance of the condition. Procrastination on the part of either the dentist or the patient only delays definitive treatment and worsens the prognosis. On the other hand, patients can become irrationally distraught with the bad news and thrown into a state of depression. Thus each dentist must carefully handle these instances in his or her own way and never forget to keep the patient's best interests in mind.

INTRAOSSEOUS, OR HARD TISSUE, BIOPSY TECHNIQUE AND SURGICAL PRINCIPLES

A lesion either on or within the osseous tissues of the jaws requires investigation. Frequently, problems related to the dentition are the primary cause, and osseous lesions resolve with proper dental treatment. However, any lesion that seems unrelated to the dentition or does not respond to the customary treatment of the dentition should have tissue removed for definitive diagnosis.

The most common intraosseous lesions the dentist will encounter are periapical granulomas and cysts of the jaws. Because these have a characteristic radiographic appearance and are usually asymptomatic, a presumptive diagnosis is frequently possible. However, treatment may involve surgical removal of the cyst in the form of an excisional biopsy. When a lesion is large, perforating into soft tissues, or suspected of malignancy, incisional biopsy is indicated.

Before performing hard tissue biopsy, the dentist should carefully palpate the area of the jaws where the suspect lesion is located. Comparison with the opposite side is helpful. Bone that feels smooth and firm to palpation usually indicates that the lesion has not expanded or eroded the cortical plate. A spongy feel to the jaw when compressed indicates erosion or thinning of the cortical plates. This knowledge may change the approach to treatment, as is discussed later.

Hard tissue biopsies are no different in their surgical and pathologic principles from soft tissue biopsies; however, their location mandates some special considerations.

Aspiration Biopsy of Radiolucent Lesions

Any radiolucent lesion that requires biopsy should undergo aspiration before surgical exploration. This provides the dentist with valuable diagnostic information regarding the nature of the lesion. The results of aspiration may make the dentist decide to refer the patient to another clinician. For example, brisk, pulsating blood may indicate a vascular lesion, which should not undergo surgical exploration by the general dentist. The return of straw-colored fluid would corroborate the presumptive diagnosis of a cyst, and surgical removal can then be undertaken without hesitation. The aspiration of air may indicate that the needle tip is within the maxillary sinus or a traumatic bone cavity. The technique for aspiration was outlined previously.

Mucoperiosteal Flaps

Because of their location within or proximal to the jaws, most lesions of hard tissue must be approached through a mucoperiosteal flap. Several varieties of mucoperiosteal flaps are available; the choice depends chiefly on the size and location of the lesion.

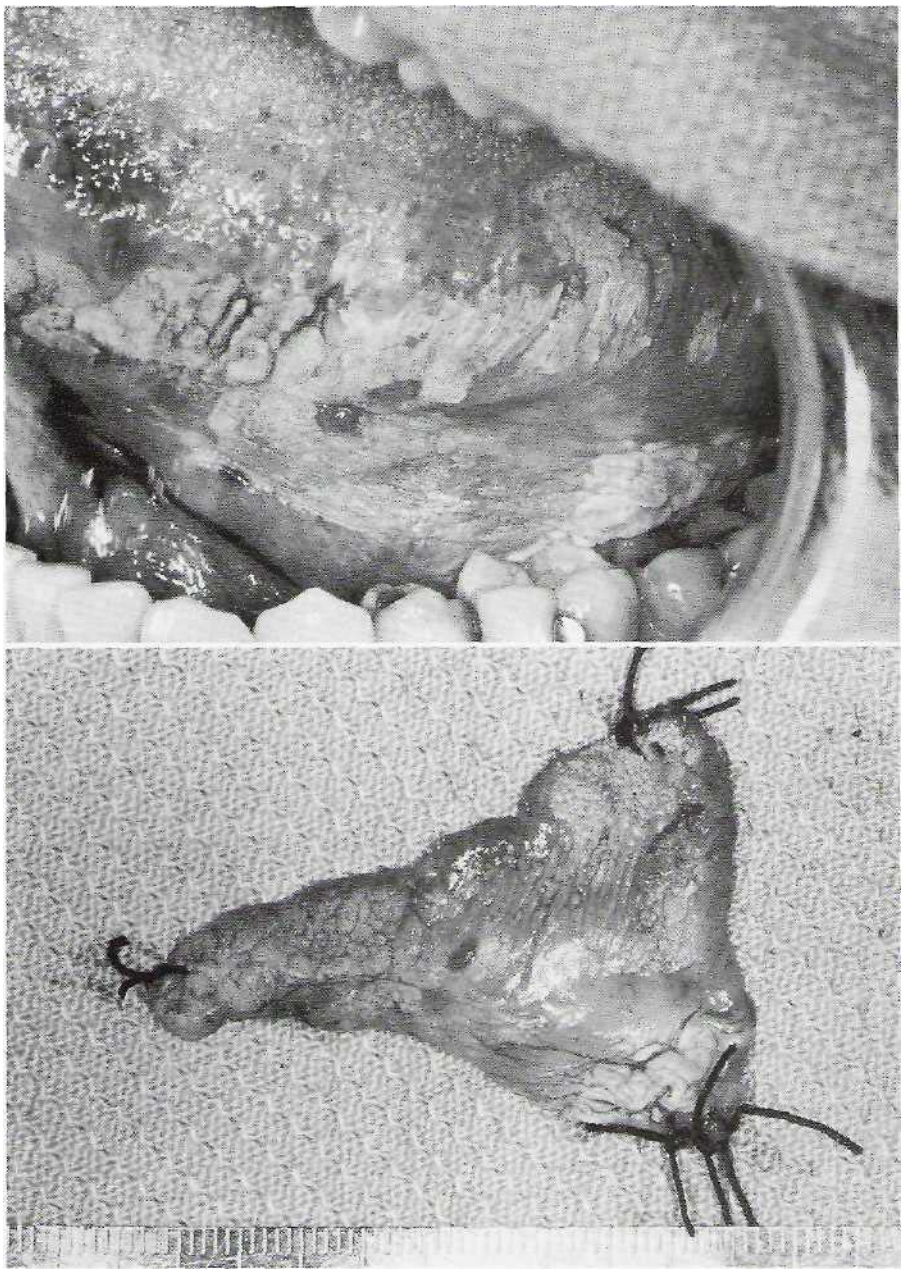

FIG. 21-13 **A,** Lesion described in Figure 21-12. B, Specimen after removal. Note marking of margins with sutures to orient pathologist.

the same for surgery for an impacted tooth or an osseous biopsy. The size of the lesion dictates how much access is necessary when excisional biopsy is indicated. Access may necessitate extension of the irmcoperiosteal flap. The location of the lesion dictates where the flap incisions are to be made. It is important to avoid major neurovascular structures when possible and to keep incisions over sound bone for closure. Optimally the flap design should provide 4 to 5 mm of sound bone around the anticipated surgical margins. A central lesion that may have eroded the cortical plate of the jaw is always approached with flap elevation in an area away from the lesion and over sound bone. This technique allows establishment of the proper tissue plane for dissection. As lesion is approached, fusion of the periosteum to the expanding lesion can more readily be ascertained. mucoperiosteal flaps for biopsies in or on the jaws *she* be full thickness and incised through mucosa, submucosa, and periosteum. The dissection to expose the bone is always performed subperiosteally.

Osseous Window

Lesions within the jaws (i.e., central lesions) require use of a cortical window. If expansion of a central le has eroded the cortical plate to the point that an osseous void is seen once the flap has been elevated, this window

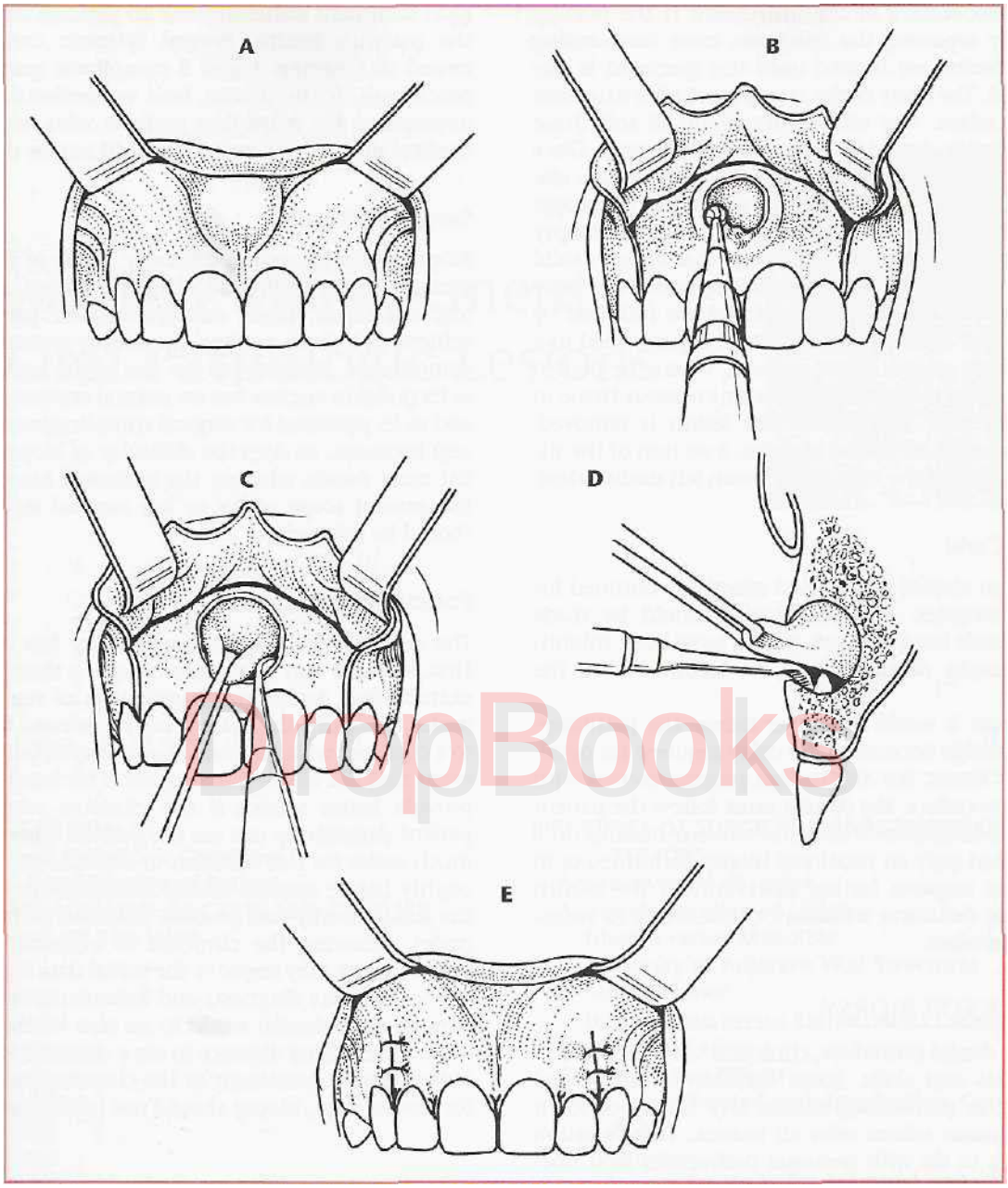

FIG. 21-14 Illustrations demonstrating enucleation of cyst. **A**, Mild swelling in area of periapical cyst. **B**, Mucoperiosteal flap is elevated from around necks of teeth, and bur is used to remove thinned cortical bone overlying cyst. Care is taken to prevent rupturing cystic contents during this and following steps. **C** and **D**, Spoon type of curette is used to strip cyst from bone. Note concave side of curette is kept in contact with bone. Convex surface is working end of instrument. **E**, Closure.

cortical plate is intact, a rotating bur should be used to remove an osseous window (Fig. 21-14). The size of the window depends on the size of the lesion and the proximity of the window to normal anatomic structures such as roots and neurovascular bundles. Once the window has been created, it can be enlarged with a rongeur. The osseous window specimens should always be submitted for histopathologic examination along with the primary specimen.

Removal of Specimen

The technique for removal of the biopsy specimen depends on the nature of the biopsy (excisional versus incisional) and the consistency of the tissue encountered. Most small lesions that have a connective tissue capsule (e.g., cysts) can be removed in their entirety. A dental curette is used to peel the connective tissue wall of the specimen from surrounding bone. The concave surface of the instrument should always be kept in contact with the osseous surfaces of the bone cavity (see Fig. 21-14).

The convex surface of the instrument is the portion that actually separates the specimen from surrounding bone. This technique is used until the specimen is free and removed. The bony cavity is inspected after irrigation with sterile saline. Any residual fragments of soft tissue within the cavity should be removed with curettes. Once the cavity is devoid of residual pathologic tissue, it is irrigated and the flap is replaced and sutured in its proper location. If the dentist is performing an excisional biopsy and encounters a soft tissue specimen that appears solid and poorly separable from surrounding bone, the same procedure as just outlined is performed but followed by curettage of the bony cavity. Curettage is performed in a similar manner on tooth root surfaces, where the dentist tries to remove a millimeter of adjacent osseous tissue in all directions after the bulk of the lesion is removed. When performing incisional biopsies, a section of the tissue is removed and the remaining lesion left undisturbed.

Specimen Care

The specimen should be handled exactly as outlined for soft tissue biopsies. The pathologist should be made aware that both hard and soft tissues have been submitted. Radiographs should always be included with the specimen.

It may take 2 weeks or longer before the pathology report is available because of the delay required for decalcification of tissue. For any benign process excised with the biopsy procedure, the dentist must follow the patient with serial radiographs to monitor osseous healing. In a lesion that had only an incisional biopsy performed or in a lesion that requires further intervention, the dentist must see that definitive treatment of the lesion (if necessary) is undertaken.

REFERRALS FOR BIOPSY

As with any dental procedure, clinicians vary in their surgical interests and skills. Some dentists are adept and comfortable in performing almost any biopsy on their patients, whereas others refer all lesions. This variation has as much to do with personal preferences as it does with level of skills. However, the dentist may use certain criteria to determine which biopsies to perform personally and which to refer. These can be summarized into the following categories.

Health of Patient

Dentists frequently encounter patients who have sys temic conditions or disease processes that make any surgical treatment either difficult to perform or a hazard to the patient's health. Several systemic conditions discussed in Chapters 1 and 2 complicate routine surgical procedures. If the dentist feels uncomfortable about or unprepared for managing patients who require special medical precautions, referral should not be delayed.

Surgical Difficulty

Biopsies vary in surgical difficulty. If any of the basic surgical principles outlined in Chapter 3 (e.g., access, lighting, anesthesia, tissue stabilization) are problematic to achieve in a given patient, the biopsy procedure is more complicated. Similarly, as the size of the lesion increases, as its position encroaches on normal anatomic structures, and as its potential for surgical complications (e.g., bleeding) increases, so does the difficulty of biopsy. Each dentist must decide whether the indicated biopsy is within the general scope of his or her surgical skills. If not, it should be referred.

Potential for Malignancy

The dentist who suspects malignancy has two choices. First, a biopsy can be performed *after* a thorough clinical examination, including examination of regional lymph nodes. Secondly, the patient can be referred *before* biopsy to a clinician who can treat the patient definitively in the event that the lesion is malignant. This latter choice may provide better service if the clinician who treats the patient definitively can see the patient immediately. It is much easier for this clinician to evaluate the lesion thoroughly before surgical manipulation. Biopsy can distort the lesion locally and produce palpable, inflamed lymph nodes. Allowing the clinician to evaluate the patient before biopsy may improve the initial data base and allow" a more accurate diagnosis and formulation of treatment. However, if a dentist works in an area where the patient must travel a long distance to see a clinician who can provide definitive treatment or the clinician cannot be seen for several days, biopsy should not be delayed.

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